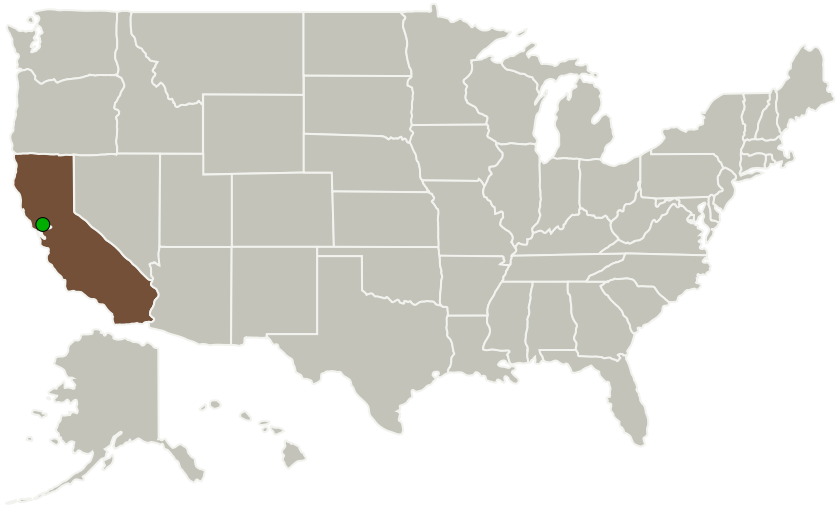
Cell Phone-based Lateral Flow Assay for Blood Biomarker Detection, Phase I

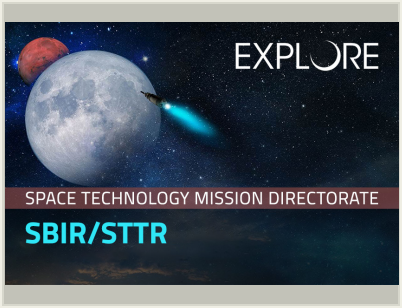
Completed Technology Project (2012 - 2012)

Project Introduction

The ability to integrate a sensor platform with a cell phone for health monitoring and disease diagnosis for astronauts in space exploration has the potential to be cost effective and space saving. In this proposal, Intelligent Optical Systems (IOS) will build upon expertise in lateral flow test strip (LFTS) assays by integrating an LFTS with a cell phone for the quantitative measurement of blood-based biomarkers. Our innovative and extremely cost-effective multi-analyte LFTS approach is imminently suited for space travel. All "microfluidics" (sample transport, reagent storage, mixing, etc.) take place via capillary action with no moving parts, no flow channels, and in a 5 mm x 5 mm x 30 mm space. Taking advantage of the built-in flash and high resolution camera, we will modify a commercially available cell phone with optical filters, lenses, a UV LED excitation source and a cassette holder for LFTS image capture. Quantum dots (QD) will be incorporated as labels with high quantum yield, resulting in higher sensitivity and narrow emission peaks in a multiplexed assay. In Phase I, we will develop and optimize a cell phone-based LFTS platform with the ability to quantitatively detect multiple biomarkers within clinically relevant ranges. The images of the LFTS will be captured on the cell phone and analyzed on a computer by the end of the Phase I. In Phase II, we will develop cell phone-based software for on-cell phone detection and data processing with expanded panels of biomarkers; advancing the TRL from 5 to 7.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Intelligent Optical Systems, Inc.	Lead Organization	Industry	Torrance, California
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140303)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Intelligent Optical Systems, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Henry Lin

Co-Investigator:

Henry Lin

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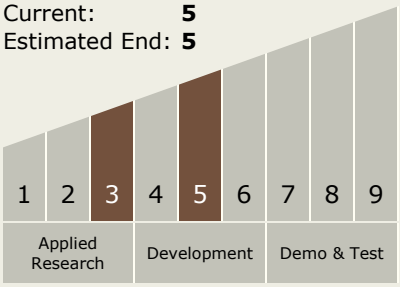
Completed Technology Project (2012 - 2012)

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.1 Medical Diagnosis and Prognosis

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System